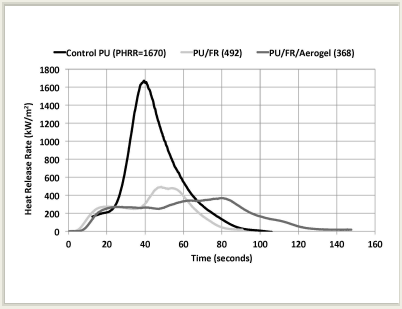
New Flexible FR Polyurethane Foams for Energy Absorption Applications, Phase II

Completed Technology Project (2013 - 2016)

Project Introduction

Project involves development of new flexible FR polyurethane (PU)insulation foams through a non-toxic environmentally friendly composite approach. Foams have bound-in polymeric phosphonate FRs, with added synergists and smoke suppressants. Such foams will not leach FR. Foams have fine cell structure and excellent flexible foam properties. Cone performance of the identified foam family (368 peak rate of heat release versus 1670 control - 78% reduction in PHRR) clearly surpasses that of standard commercial flexible PU foams: 502 to 913 for CAL 133 compliant foams, 953 for BS5852 compliant foam, and 1154 for CAL 117 compliant PU foam. Project foams easily comply with NASA 6001 open flame testing. Foams with under 3.0 pcf are available. Procedures for incorporation of significant Aerogel concentrations (5 pbw to 15 pbw), useful for cryogenic and low temperature insulation, have been identified and tested. Results are based on over 200 foams made in small scale and 100 foams prepared as 5L molded foams. Phase II of Project involves scale-up of foams in the foam family, preparation of intermediate scale samples capable of more detailed application testing, performing such testing (Eg. cryogenic insulation testing), and sampling of foams to potential customers identified by the project expert Commercialization Panel. In working with foam vendors on intermediate scale sample preparation, potential commercial partners will be identified and assessed. Large scale runs are also planned. Potential commercial partners will have the opportunity to gain experience with the foams in intermediate scale sample preparation. Selected partners will have the opportunity to share their experience with the Commercialization Panel to focus on highest value applications and needed performance. Such interaction will lead to partnering, licensing and joint venture discussions.



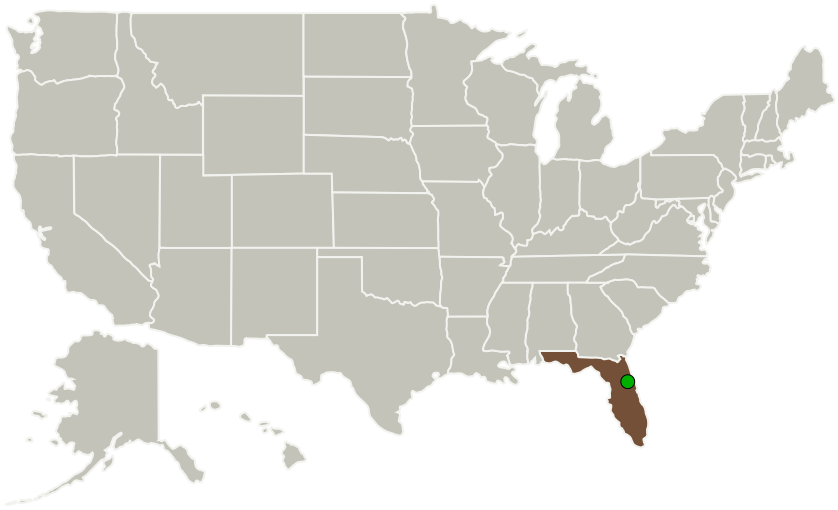
New Flexible FR Polyurethane Foams for Energy Absorption Applications, Phase II

Table of Contents

New Flexible FR Polyurethane Foams for Energy Absorption Applications, Phase II

Completed Technology Project (2013 - 2016)

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Gordon Nelson and Associates	Lead Organization	Industry	Melbourne, Florida
Florida Institute of Technology	Supporting Organization	Academia	Melbourne, Florida
Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida

Primary U.S. Work Locations
Florida

Project Transitions

July 2013: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Gordon Nelson and Associates

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

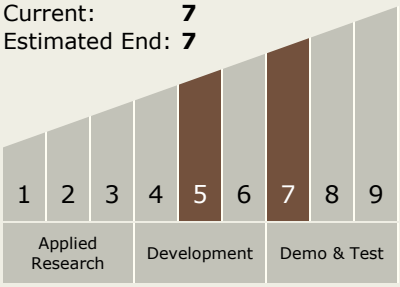
Carlos Torrez

Principal Investigator:

Matthew Jensen

Technology Maturity (TRL)

Start: **5**
Current: **7**
Estimated End: **7**



New Flexible FR Polyurethane Foams for Energy Absorption Applications, Phase II

Completed Technology Project (2013 - 2016)

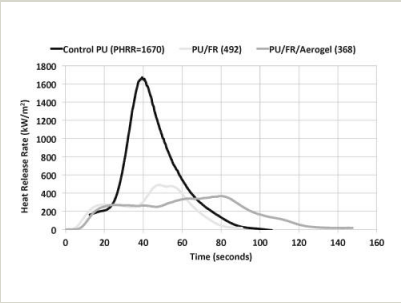
October 2016: Closed out

Closeout Summary: New Flexible FR Polyurethane Foams for Energy Absorption Applications, Phase II Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/137644)*

Images



Briefing Chart Image
New Flexible FR Polyurethane Foams for Energy Absorption Applications, Phase II *(https://techport.nasa.gov/image/128970)*

Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.1 Infrastructure Optimization
    - TX13.1.4 Propellant Production, Storage and Transfer

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System